Towards the Synthesis of Diverse Types of Carrageenan Oligosaccharides

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Towards the Synthesis of Diverse Types of Carrageenan Oligosaccharides

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Carrageenans are a family of linear sulfated polysaccharides that are extracted from red seaweeds. They play important roles in the biology of algae and furthermore they have many important industrial applications, such as gelling agent in the food industry. The idealized structures of the 10 known types of carrageenans are presented in Figure 1. The carrageenans are intriguing structures: they have a backbone of D-galactose with alternating β-1,4 and α-1,3 bonds with varying degree of sulfation of the 2, 6, 2' and 4'-positions. Upon treatment with alkali, an 1,3-anhydrogalactose is formed and the α-linked galactose residues undergo a conformational change from $^4C_1$ to $^1C_4$ which increases the gelling property of the molecule [2]. We wish to synthesize well-defined oligocarrageenans. Our synthetic strategy aims at producing all ten types of carrageenans from a single precursor carrying different protecting groups that can be cleaved specifically to introduce the sulfate groups at various positions depending on the targeted carrageenan.

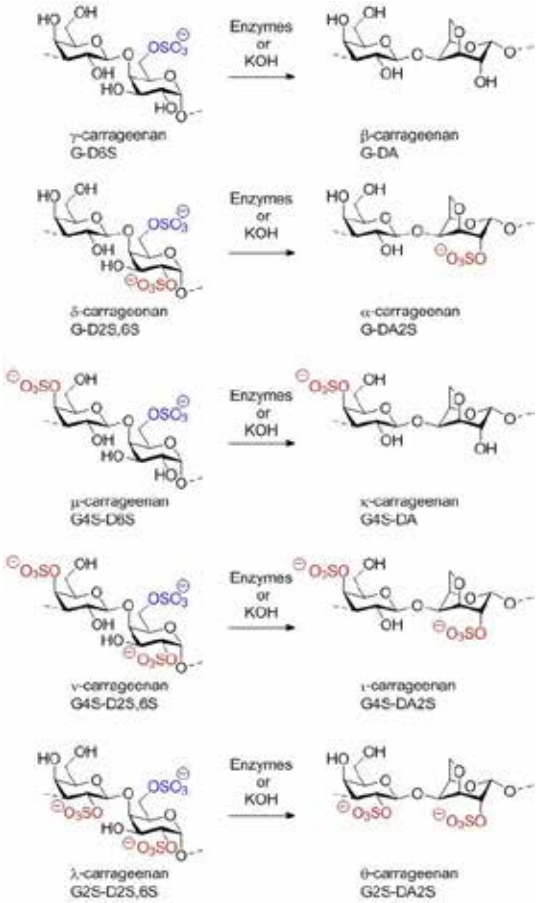

Figure 1. Ten types of idealized repeating units of carrageenans [1].

[1] Necas J.; Bartosikova L.; Carrageenan: A review. Veterinarni Medicina **2013**, *58*, 187-205.
[2] Hoffmann R. A.; Gidley M. J.; Cooke D.; Frith W. J.; Effect of isolation procedures on the molecular composition and physical properties of Eucheuma cottonii carrageenan. Food Hydrocolloids **1995**, *9*, 291-289.